

Mathematics 108, Calculus II for Business
Spring semester 1997
Syllabus

Math 108 is designed to meet the needs of the business majors and is a continuation of Math 105. Thus is assumed that the students are familiar with:

1. Linear, polynomial, exponential, logarithmic and trigonometric functions.
2. The derivative and its basic applications in optimization problems, and curve sketching.

The goal of this course is to introduce the basic concepts of this part of Mathematics through problems arising in Business and Economics. Then, after the necessary mathematical techniques are developed more applications to Business and Economics will be presented in class, and as exercises in the homework. Thus, it is hoped to motivate the business students to learn and enjoy mathematics. Since mathematics provides the language to state explicitly and precisely complicated Economics problems and a wealth of mathematical techniques to study them.

Texts: “Calculus and its Applications”(Seventh Edition), by Goldstein, Lay and Schneider. And “Math 108 Lecture Notes, Spring 1997” by Alex. Himonas.

1. *Integration*

- 1.1 The Indefinite Integral
- 1.2 The Initial Value Problem
- 1.3 The Definite Integral of Nonnegative Functions
- 1.4 Definite Integral of General Continuous Functions and Area
- 1.5 The Fundamental Theorem of Calculus
- 1.6 Area between two Curves

2. *Applications of Definite Integral in Business and Economics*

- 2.1 Average Value of Continuous Quantities
- 2.2 From Marginal Function to Total Function
- 2.3 Consumer and Producer Surplus
- 2.4 Future and Present Value of a Continuous Income Stream

3. *Methods of Integration and Improper Integrals*

- 3.1 Integration by Substitution and by Parts
- 3.2 Numerical Methods
- 3.3 Improper Integrals

4. *Differential Equations and Applications*

- 4.1 First Order Linear Differential Equations
- 4.2 Separable Differential Equations
- 4.3 The Solow Growth Model
- 4.4 The Logistic Growth Model

- 5. *Geometry in n -Space, Matrix Algebra and Applications*
 - 5.1 Systems of Linear Equations
 - 5.2 Vectors in n -Dim-Space
 - 5.3 Matrices
 - 5.4 Systems in Matrix Form and Inverse of a Matrix
 - 5.5 Determinants and Cramer's Rule
 - 5.6 Eigenvalues and Eigenvectors

- 6. *Functions of Several Variables and Applications*
 - 6.1 Cartesian Coordinates, Planes and Linear Functions
 - 6.2 Sketching Surfaces in Three-Dimensional Space and Level Curves
 - 6.3 Partial Derivatives
 - 6.4 Maxima and Minima for Functions of Two Variables
 - 6.5 The Method of Least Squares or Lines of Regression
 - 6.6 Constrained Optimization and Lagrange Multipliers

- 7. *Probability and Statistics*
 - 7.1 Experiments and Sample Spaces
 - 7.2 Assignment of Probabilities
 - 7.3 Discrete Random variables, Expected Values and Variances
 - 7.4 Continuous Random Variables
 - 7.5 Expected Value, Variance, and Standard Deviation
 - 7.6 Commonly Used Continuous Probability Densities